AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

1-11. (Cancelled).

12. (New) An inertial sensor based on the magnetic levitation of a ferromagnetic spherical or cylindrical inertial mass and comprising:

- six electromagnets diametrically disposed in pairs along three orthogonal axis, said pairs of electromagnets constituting means for levitation and differential actuation of said inertial mass,

- six position sensors diametrically disposed in pairs along three orthogonal axis, said pairs of position sensors constituting means for differential measurements of the position of said inertial mass,

wherein said pair of electromagnets, together with said pairs of position sensors and said inertial mass, constitute an active magnetic bearing which give the means for:

- controlling the position of said inertial mass along three independent axis,

- creating, for any of said independent axis, restoring forces that can be oriented in any of the two directions of said independent axis,

wherein said active magnetic bearing is enclosed in an outer frame made of homogeneous ferromagnetic material; said outer frame constituting a magnetic shielding of said inertial sensor,

wherein said outer frame of said inertial sensor is hermetically sealed in order to offer the possibility of creating and keeping vacuum inside said outer frame, wherein a lock-in amplifier is used for the signal conditioning of said position sensors.

13. (New) An inertial sensor based on the magnetic levitation of a ferromagnetic inertial mass and comprising:

- six coils which axis are vertical and parallel to each other,

- magnetic permeable cores used to guide the magnetic field from said coils to the vicinity of said inertial mass,

- a position sensing system composed of two laser diodes and two four segments photodiodes,

wherein said laser diodes as well as said photodiodes are placed in the same horizontal plane,

wherein said position sensing system constitutes means for differential measurements of the position of said inertial mass,

wherein the combination of said coils together with said magnetic permeable cores constitutes three independent differential actuators, providing means for levitation and differential actuation of said inertial mass along said three independent axis,

wherein said coils, together with said position sensing system and said inertial mass, constitute an active magnetic bearing which gives the means for:

- controlling the position of said inertial mass along three independent axis

- creating, for any of said independent axis, restoring forces that can be oriented in any of the two directions of said independent axis,

wherein said active magnetic bearing is enclosed in an outer frame made of homogeneous ferromagnetic material; said outer frame constituting a magnetic shielding of said inertial sensor,

wherein said outer frame of said inertial sensor is hermetically sealed in order to offer the possibility of creating and keeping vacuum inside said outer frame wherein a lock-in amplifier is used for the signal conditioning of said position sensors.

14. (New) A method of using an inertial sensor according to claim 12, wherein the inertial sensor is used as a three dimensional non-contact accelerometer or as a three dimensional non-contact seismometer.

15. (New) A method of using an inertial sensor according to claim 13, wherein the inertial sensor is used as a three dimensional non-contact accelerometer or as a three dimensional non-contact seismometer.

16. (New) A method of using an inertial sensor according to claim 12, wherein the inertial sensor is used as a three dimensional non-contact tiltmeter (inclinometer).

17. (New) A method of using an inertial sensor according to claim 13, wherein the inertial sensor is used as a three dimensional non-contact tiltmeter (inclinometer).

18. (New) A method of using an inertial sensor according to claim 12 comprising a motor function implemented by applying a rotating magnetic field to, at least, two of said pairs of electromagnets in order to spin said inertial mass around the main axis of inertia of said inertial mass.

19. (New) A method of using an inertial sensor according to claim 13 comprising a motor function implemented by applying a rotating magnetic field to, at least, two of said differential actuators in order to spin said inertial mass around the main axis of inertia of said inertial mass.

20. (New) A method of using an inertial sensor according to claim 12, wherein the inertial sensor is used as a three dimensional non-contact gyroscope.

21. (New) A method of using an inertial sensor according to claim 13, wherein the inertial sensor is used as a three dimensional non-contact gyroscope.

22. (New) A method of using an inertial sensor according to claim 12, wherein the inertial sensor is used as a three dimensional non-contact gravimeter.

23. (New) A method of using an inertial sensor according to claim 13, wherein the inertial sensor is used as a three dimensional non-contact gravimeter.